Application No.: 10/028,978 Docket No.: 21994-00036-US

AMENDMENTS TO THE CLAIMS

This listing of the claims will replace all prior versions and listing of the claims in this application:

Listing of Claims:

1. (Currently amended) An information recording medium ~~at least~~ comprising:

a substrate having a microscopic pattern, ~~which is constituted by~~ having a continuous shape of ~~continuous substance of~~ approximately parallel grooves formed with a alternating groove ~~section and a land section alternately~~ and land sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer;

wherein the ~~information recording layer is characterized in that the~~ microscopic pattern is formed so as to satisfy a relation of $P < \lambda \leq / NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens; and

whereby the land section is wobbled in the radial direction as a result of being subjected to a method of phase modulation.

2. (Currently amended) The information recording medium in accordance with claim 1, wherein a record based on at least one of reflectivity difference and phase difference is performed onto either one of the groove ~~section~~ and ~~the~~ land ~~section~~ sections.

3. (Original) The information recording medium in accordance with claim 1, wherein the wavelength λ is within a range of 350 to 450 nm and the numerical aperture NA is within a range of 0.75 to 0.9.

4. (Currently amended) The information recording medium in accordance with claim 2, wherein recording in accordance with at least one of the reflectivity difference and the phase difference is performed so that ~~as for~~ the modulated amplitude exceeds ~~to be more than~~ 0.4.

5. (Currently amended) The information recording medium in accordance with claim 2, wherein recording in accordance with at least one of the reflectivity difference and the phase difference is performed so that ~~as for~~ the reflectivity exceeds ~~to be more than~~ 5 %.

6. (Original) The information recording medium in accordance with claim 1, wherein the recording layer is formed by a phase change material.

7. (Currently amended) A reproducing apparatus for reproducing an information recording medium at least comprising:

a substrate having a microscopic pattern, having a ~~which is constituted by a shape of~~ continuous shape ~~substance~~ of approximately parallel grooves formed with alternating a groove ~~section~~ and a land ~~section alternately~~ sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer;

wherein the ~~information recording layer is characterized in that the~~ microscopic pattern is formed so as to satisfy a relation of $P < \lambda \leq / NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, and wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens; ~~and~~

~~wherein the land section is wobbled in the radial direction as a result of being subjected to a method of phase modulation;~~

the reproducing apparatus comprising:

a pickup composed of a light emitting element having a wavelength of λ within a range of 350 to 450 nm and an objective lens having a numerical aperture of NA within a range of 0.75 to 0.9 for reading out reflected light from the information recording medium;

a motor for rotating the information recording medium;

servo means for controlling ~~to~~ the drive of the pickup and the motor;

a turntable for supporting the information recording medium while rotating;

demodulator means for demodulating an information signal read out by the pickup;

interface (I/F) means for transmitting a signal demodulated by the demodulator externally; and

controlling means for controlling the reproducing apparatus totally.

8. (Currently amended) The reproducing apparatus in accordance with claim 7, the ~~recording~~ reproducing apparatus further comprising an auxiliary information demodulator for demodulating a differential signal outputted from the pickup.

9. (Currently amended) A recording apparatus for recording an original information signal on an information recording medium ~~at least~~ comprising:

a substrate having a microscopic pattern, having ~~which is constituted by~~ a continuous shape of ~~continuous substance of~~ approximately parallel grooves formed with alternating ~~a~~ groove ~~section~~ and ~~a~~ land ~~section alternately~~ sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer;

wherein the ~~information recording layer is characterized in that the~~ microscopic pattern is formed so as to satisfy a relation of $P < \lambda < / NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, and wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens, and wherein the land section is wobbled in the radial direction as a result of being subject to a method of phase modulation,

the recording apparatus comprising:

a pickup composed of a light emitting element having a wavelength of λ within a range of 350 to 450 nm and an objective lens having a numerical aperture of NA within a range of 0.75 to 0.9 for reading out reflected light from and recording on the information recording medium;

a motor for rotating the information recording medium;

servo means for controlling to drive the pickup and the motor;

a turntable for supporting the information recording medium while rotating;

interface (I/F) means for receiving the original information signal to be recorded;

modulator means for modulating the original information signal;

waveform converter means for converting the original information signal into a format suitable for a recording characteristic of the recording layer of the information recording medium;

auxiliary information demodulator means for demodulating a differential signal outputted from the pickup; and

controlling means for controlling the entire recording apparatus ~~totally~~.

10. (New) An information recording medium comprising:

a substrate having a microscopic pattern, having a continuous shape of approximately parallel grooves formed with alternating groove and land sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer;

wherein the microscopic pattern is formed so as to satisfy a relation of $P < \lambda/NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of objective lens; and

wherein scattering of the thickness of the light transmission layer is within a range of $\pm$ 0.002 mm over the entire light transmission layer.

11. (New) The information recording medium in accordance with claim 10, wherein a record based on at least one of reflectivity difference and phase difference is performed onto either one of the groove section and the land section.

12. (New) The information recording medium in accordance with claim 10, wherein the wavelength λ is within a range of 350 to 450 nm and the numerical aperture NA is within a range of 0.75 to 0.9.

13. (New) The information recording medium in accordance with claim 11, wherein recording in accordance with at least one of the reflectivity difference and the phase difference is performed so that the modulated amplitude exceeds 0.4.

14. (New) The information recording medium in accordance with claim 11, wherein recording in accordance with at least one of the reflectivity difference and the phase difference is performed so that the reflectivity exceeds 5 %.

15. (New) The information recording medium in accordance with claim 10, wherein the recording layer is formed by a phase change material.

16. (New) A reproducing apparatus for reproducing an information recording medium comprising:

a substrate having a microscopic pattern, having a continuous shape of approximately parallel grooves formed with alternating groove and land sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer;

wherein the microscopic pattern is formed so as to satisfy a relation of $P < \lambda/NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, and

wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens;

the reproducing apparatus comprising:

a pickup composed of a light emitting element having a wavelength of λ within a range of 350 to 450 nm and an objective lens having a numerical aperture of NA within a range of 0.75 to 0.9 for reading out reflected light from the information recording medium;

a motor for rotating the information recording medium;

servo means for controlling to drive the pickup and the motor;

a turntable for supporting the information recording medium while rotating;

demodulator means for demodulating an information signal read out by the pickup;

interface (I/F) means for transmitting a signal demodulated by the demodulator externally; and

controlling means for controlling the entire reproducing apparatus.

17. (New) The reproducing apparatus in accordance with claim 16, the reproducing apparatus further comprising an auxiliary information demodulator for demodulating a differential signal outputted from the pickup.

18. (New) A recording apparatus for recording an original information signal on an information recording medium comprising:

a substrate having a microscopic pattern, having a continuous shape of approximately parallel grooves formed with alternating groove and land sections;

a recording layer formed on the microscopic pattern; and

a light transmission layer formed on the recording layer;

wherein the microscopic pattern is formed so as to satisfy a relation of $P < \lambda/NA$ and a thickness of the light transmission layer is within a range of 0.07 to 0.12 mm, and

wherein P is a pitch of the groove section or the land section, λ is a wavelength of reproducing light beam and NA is a numerical aperture of an objective lens,

the recording apparatus comprising:

a pickup composed of a light emitting element having a wavelength of λ within a range of 350 to 450 nm and an objective lens having a numerical aperture of NA within a range of 0.75 to 0.9 for reading out reflected light from and recording on the information recording medium;

a motor for rotating the information recording medium;

servo means for controlling to drive the pickup and the motor;

a turntable for supporting the information recording medium while rotating;

interface (I/F) means for receiving the original information signal to be recorded;

modulator means for modulating the original information signal;

waveform converter means for converting the original information signal into a format suitable for a recording characteristic of the recording layer of the information recording medium;

auxiliary information demodulator means for demodulating a differential signal outputted from the pickup; and

controlling means for controlling the entire recording apparatus.